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Research Article

An intervention to improve the knowledge of anganwadi workers pertaining to growth monitoring in rural areas of Varanasi district, India

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ABSTRACT

Background: Growth monitoring is one of the important functions of anganwadi workers (AWWs), for which they should have sufficient knowledge and training. With this background it was hypothesized that educational intervention can make a difference in the level of knowledge of AWWs in regard to growth monitoring. The main objective of the study was to evaluate the changes in knowledge of Anganwadi workers regarding growth monitoring through knowledge up-gradation training.
Methodology: It was a field based interventional study, which was conducted on 66 AWWs each from Chiraigaon (intervention) and Cholapur (control) blocks of Varanasi district. The primary tool in this study was a pre-designed and pretested interview schedule for collecting information's pertaining to study objective.
Results: The mean score of knowledge was around 19.7 (max. Score was 30) in both the blocks during baseline survey and almost all the AWWs were having either average or good knowledge of growth monitoring. Post intervention a significant ($p<0.01$) difference has been observed between the mean knowledge scores of AWWs in intervention (25.32±2.44) and control (20.35±2.70) blocks and as much as 48.5% of AWWs were having excellent knowledge about growth monitoring in Chiraigaon block ($p<0.01$), while the situation was unchanged in Cholapur block.
Conclusion: The knowledge up-gradation was found effective in improving the knowledge status of AWWs with regard to growth monitoring.

Keywords: Anganwadi worker, Growth monitoring, Knowledge up-gradation, Intervention study

INTRODUCTION

Early childhood developments constitute the foundation for the human development. Early years of the life are the most crucial period for the physical, mental, social, emotional, language development and lifelong learning. In a malnourished child, development of the milestones is delayed.[1] As per NFHS-3, almost half of the children under age five years (48 percent) are chronically malnourished. In other words, they are too short for their age or stunted, Forty-three percent of children of under five years are underweight for their age while one out of every five children in India under five years is wasted. Nutritional problems are substantial in every state of India. In Uttar Pradesh more than 40 percent of children under five are underweight. Despite efforts to improve

the nutritional status of young children, especially through the Integrated Child Development Services (ICDS) programme, there has not been much improvement in recent years.[2] The effective outcome of the nutrition services rendered through the Anganwadi centers (AWCs) depends on the knowledge of the Anganwadi workers regarding growth monitoring (GM). A sound knowledge of the AWWs strengthens their skills and raises their capabilities to early identify the children moving towards malnutrition with the help of regular GM so as to take appropriate and early corrective action for further departure from good health. It also helps them as a teaching tool for empowering the mothers for preventive actions and better nutrition care of their children. With this background, it was hypothesised that educational intervention can make a difference in the level of knowledge of AWWs in regard with growth monitoring. Therefore, in this study the attempt has been made to assess the knowledge of AWWs about GM activities and the influence of reorientation training on their correct knowledge improvement.

The main objective of the study was to evaluate the changes in knowledge of Anganwadi workers regarding growth monitoring after knowledge up-gradation intervention

METHODS

The study was a field based Intervention study, which was conducted in Varanasi district of Uttar Pradesh state in India. The intervention group of AWWs were selected from Chiraigaon community development block of Varanasi district, while control group of AWWs were chosen from the nearby adjacent block (Cholapur), considering the similar socio demographic milieu. The study was conducted for a period of 5 years (October 2010 to September 2015) with the objective to assess the effect of knowledge and skill up gradation intervention regarding growth monitoring on anganwadi workers.

Available pertinent literature was searched on the subject for determination of sample size. It was found that majority of the studies undertaken related to knowledge and skill of AWW are cross sectional, which only helps to assess the current status of knowledge and skill of AWWs about growth monitoring. Skill of AWWs regarding correct plotting and interpretation of growth charts was considered as the factor to determine the sample size for the study. Not many of Interventional study have been undertaken in India since the introduction of New WHO Growth Chart 2006 and its implementation by ICDS in this direction. So, a pilot study was conducted on 40 Anganwadi Workers in Chiraigaon Community Development Block, which showed a prevalence rate of 8.5% of correct skill for plotting and interpretation of growth charts among Anganwadi Workers. It was decided to assess a difference of 20% was between the two groups (intervention and control) after intervention. Considering the prevalence, the sample size for this study was calculated using the formula:

$$n= 2(Z\alpha + Z\beta)^2 (P_1 Q_1 + P_2 Q_2) / (P_1 - P_2)^2$$

Where, n= Sample size, z= 1.64 (one sided), Z_a = 1.64 at 5% level of significance, $Z_ß$ = 1.28 at 90% power, P_1= Proportion of study subjects having correct skill for plotting and interpreting growth chart. (0.08), P_2= Proportion of correct skill after intervention in the study group (0.28), $Q_1 = 1-P_1 = 0.92$, $Q_2 = 1-P_2 = 0.72$ and P_1-P_2= 20%. The required sample size calculated was n= 117.3 = 118 (for both intervention and control group). Thus, sample size for each group was 59. Also, 10% potential attrition (non- participation rate) was considered (100/90*118=131.1=132) post intervention. Thus the final sample size for each group was taken as 66.

Two stages were involved in the selection of study subjects. In the first stage, one Community Development Block (i.e. Chiraigaon) was selected from eight Community Development Blocks of Varanasi District by non-probability purposive sampling. Cholapur community development block is geographically adjacent to chiraigaon community development block; A quick survey was conducted before the baseline data collection to prepare the sampling frame and for group matching of selected AWWs based on all known socio-demographic, work and training related variables.

In the second stage selection of villages to be included in interventional and control group was done. A list of all the Anganwadi Center and their corresponding villages were made. Chiraigaon community development block has 232 Anganwadi Centres comprising of 232 Anganwadi Worker. Out of these 232 AWC 66 were selected of 66 different villages through simple random sampling method at both stages (village selection and AWC selection). During sample selection in Chiraigaon block, the villages in which pilot testing was done, were excluded and out of the remaining Anganwadi Centers 66 Anganwadi Center were randomly selected for the sampling frame. In the sampling frame the AWC, which were non- functional (No-Anganwadi Worker) were also excluded. Cholapur Block has 200 Anganwadi Worker. The similar method was applied in selecting the samples for control group.

Tools and technique

For group matching and knowledge assessment a pre-designed and pretested interview schedule was used. All study subjects were interviewed in local language. Verbal and written consent was taken and privacy was maintained at the time of interview.

Data analysis

Data generated was analysed with the help of Microsoft excel 2007 and SPSS v.16.0 software. Appropriate tables

were generated and required statistical tests (chi-square and t test) were applied to draw relevant inferences.

RESULTS

Group matching of selected AWWs from intervention and control blocks

Nearly half of the AWWs were in age group of 30-39 years in both intervention and control blocks. Almost all the respondents in the study area were Hindus. Majority of respondents in Chiraigaon were belonging to OBC caste category, while in Cholapur it was in other caste category (p>0.05). More than 90 percent of the respondents in both the blocks were currently married. Majority of the respondents in both the blocks were living in a joint family and more than half of the AWWs were having more than 10 members in their families. More than 95% of the respondents in both the blocks were residing in the village where their AWC is located. Nearly half of the AWWs in both the blocks were educated up to graduation level or above and near about two third of the AWWs' husband were educated up to graduation level and above. Majority of the AWWs' husbands were government or private employees. Majority of respondents' family in both the blocks prevail lower middle class followed by middle and lower class as per BG Prasad classification.[10] Near about one fourth of the families of the AWWs were surviving Below Poverty Line (BPL) as per the Government laid criteria of census 2011. Majority of the AWWs in both the blocks were having 5 to 10 years of work experience as anganwadi. Almost all the respondents in both the intervention and control group had received at least one training after joining as AWW and near about two third of AWWs had received at least one refresher training during their job. There was no significant difference (p >0.05) in regard with all the socio-demographic, work and training related variables between intervention and control block, thus making both the groups comparable.

Knowledge about desired weight gain in a child

During baseline survey, approximately two third of the respondents in both Intervention (60.6%) and Control (62.1%) groups were having correct knowledge about the cut off criteria for low birth weight as per WHO criteria (<2.5 kg). The intervention group could significantly (p=0.009) improve the correct knowledge about LBW criteria in intervention block (84.8%) as compared to control block (63.6%). It was found that during baseline survey, only about 10% of AWWs were having correct knowledge about the desired weight gain of child between 0 to 2 months and 2 to 4 months and only around 5% were having correct knowledge about the desired weight gain of child between 4 to 6 months. None of the AWW could tell the correct desired weight gain of child between 6 months to 3 years. The intervention was found effective in significantly (p <0.01) improving this desired knowledge among AWWs of intervention area. The proportions of correct knowledge about desired weight gain in the Chiraigaon block increased to 57.6%, 37.9%, 33.3% and 25.8% for 0-2 months, 2-4 months, 4-6 months and 6 months to 3 years, respectively. AWWs' knowledge was assessed regarding these different ranges of weighing machines (Table 1).

Table 1: Knowledge about criteria for low birth weight (lbw), desired weight gain in children and weight measuring range of weighing machines (n=66).

Variables	Baseline					Endline				
	Chiraigaon		Cholapur		P value	Chiraigaon		Cholapur		P value
	N	%	N	%		N	%	N	%	
Correct Knowledge of Cut off criteria for LBW	40	60.6	41	62.1	0.994	56	84.8	42	63.6	**0.009**
Correct knowledge about desired weight gain in a child										
0-2 months	8	12.1	7	10.6	0.784	38	57.6	6	9.1	**<0.01**
2-4 months	6	9.1	7	10.6	0.77	25	37.9	8	12.1	**0.001**
4-6 months	2	3	5	7.6	0.22	22	33.3	6	9.1	**0.001**
6 months to 3 years	0	0	0	0		17	25.8	0	0	**<0.01**
Correct knowledge about weighing machines										
Child weighing machine	11	16.7	8	12.1	0.457	43	65.2	11	16.7	**<0.01**
adult weighing machine	8	12.1	9	13.6	0.795	45	68.2	13	19.7	**<0.01**

Knowledge about weighing machines

During baseline survey it was noted that less than 15% of AWWs were aware about correct ranges of child and adult weighing machines in both the blocks. A significant (p<0.01) improvement was observed in correctness of knowledge in this regard among AWWs in the Intervention block as compared to control block. During

endline survey around two third of AWWs were responded correctly about the ranges of child and adult weighing machine each.

Knowledge about steps during growth monitoring

During baseline survey it was found that only 74.2% and 69.7% of the respondents in Intervention and control blocks respectively had considered date of birth verification as an important and first step of growth monitoring. During endline survey this proportion significantly increased (90%) in Chiraigaon Block as compared to control block (72.7%).

Taking weight measurement and plotting correct weight on the Growth Chart: All the respondents in both the blocks during baseline as well as endline survey responded that they considered weight measurement and then plotting correct weight on the growth chart as an important step for growth monitoring. Further more than 3/4th of respondents during baseline survey in both the blocks considered observation of growth curves as an important step to determine that growth and development is taking place in desired direction. This proportion increased to 95.5% in Intervention block during endline survey, while it was constant for control block ($p < 0.05$). More than 3/4th of respondents (78.8% in Chiraigaon and 77.3% in Cholapur) during baseline survey in both the blocks stated that providing correct information to the child's parents regarding child's growth on the basis of the child's current weight is the final important step for growth monitoring. This knowledge was significantly ($p < 0.05$) improved (95.5%) in Intervention block, while it remained unchanged in the control block (Table 2).

Table 2: Knowledge regarding important steps of growth monitoring and measuring weight of children (n=66).

Variables	Baseline					Endline				
	Chiraigaon		Cholapur		p value	Chiraigaon		Cholapur		p value
	N	%	N	%		N	%	N	%	
Knowledge about important steps during growth monitoring										
Correct DOB* verification	49	74.2	46	69.7	0.561	59	89.4	48	72.7	**0.015**
Correct Weight measurement	66	100	66	100	NA	66	100	66	100	NA
Correct Plotting weight on the growth chart	66	100	66	100	NA	66	100	66	100	NA
Correct Observation of growth curves	51	77.3	52	78.8	0.833	63	95.5	54	81.8	**0.014**
Correct Provide correct information to the child's parents	52	78.8	51	77.3	0.833	63	95.5	53	80.3	**0.008**
Knowledge about important steps during weight measurement										
Place the scale on a flat / leveled surface	42	63.6	43	65.2	0.856	59	89.4	41	62.1	**<0.01**
Check and readjust the weight reading to zero	46	69.7	46	69.7	1	56	84.8	46	69.7	**0.038**
Undress child/ Minimal clothing without shoes	56	84.8	54	81.8	0.64	66	100	53	80.3	**<0.01**
Make child stand on the middle of the scale's surface	10	15.2	14	21.2	0.367	37	56.1	16	24.2	**<0.01**

*DOB= Date of Birth

Knowledge about steps during weight measurement

During baseline survey, around two third of AWWs responded about placing the weighing scale on flat surface in both the blocks. This figure significantly ($p<0.01$) improved (90%) during endline in intervention block.

Around 70% of AWWs were aware about adjusting the weight reading to zero before measuring the weight. Intervention was found effective in significantly ($p= 0.038$) improving this knowledge in Chiraigaon block (84.8%). As much as 84.8% AWWs in Chiraigaon and 81.8% in Cholapur were having knowledge about undressing the child or ensuring minimal clothing and without shoes before measuring the weight. Post intervention all the AWWs were aware about this precaution in Chiraigaon block.

A very unsatisfactory (around 15%) knowledge was found in the study area about making the child stand on the middle of the scale's surface, This knowledge was significantly ($p<0.01$) improved (56%) during endline in intervention block.

Knowledge about growth chart in growth monitoring

All the respondents in both the blocks during baseline and endline survey invariably stated that Growth charts play a very significant role in assessment of growth and development of a child in growth monitoring. As much as 84.8% of respondents in Chiraigaon and 80.3% in Cholapur affirmed that severely malnourished children can be detected early with the help of growth chart. This knowledge significantly (p=0.033) improved (93.9%) through intervention in AWWs of Chiraigaon block as compared to Cholapur (81.8%). Nearly 40 percent of respondents in both the blocks perceived that regular Growth Monitoring through Growth Chart plotting can be helpful in providing early remedial interventions for a child in case a child is detected as malnourished. Whereas during endline survey this proportion was significantly (p=0.005) increased to 66.7% in Intervention block as compared to control block (42.4%) (Table 3).

Table 3: Knowledge of AWWs about role of growth chart in the growth monitoring (n=66).

Variables	Baseline					Endline				
	Chiraigaon		Cholapur		P value	Chiraigaon		Cholapur		P value
	N	%	N	%		N	%	N	%	
Knowledge about Importance of role that growth chart plays in growth monitoring										
Helps in assessment of growth and development	66	100	66	100	NA	66	100	66	100	NA
Helps in early detection of SAM	56	84.8	53	80.3	0.491	62	93.9	54	81.8	**0.033**
Helps in remedial interventions	26	39.4	26	39.4	1	44	66.7	28	42.4	**0.005**
Awareness of AWWs pertaining to benefits of regular growth monitoring										
Maintaining health of a child	66	100	66	100	NA	66	100	66	100	NA
Makes difference in parental approach towards maintenance of their child's health	41	62.1	38	57.6	0.527	57	86.4	37	56.1	**<0.01**

Awareness of benefits of regular growth monitoring

All the AWWs in both the blocks stated that regular growth monitoring is beneficial in maintaining health of a child, invariably during baseline as well as endline. Only around 60% of AWWs in both the blocks affirmed that growth monitoring makes difference in parental approach towards maintenance of their child's health. This proportion of affirmation could be increased up to 86.4% among intervention group, which was a significant (p <0.01) improvement when compared to control group.

Table 4: Knowledge about colours in growth chart and interpretation of growth curves (n=66).

Variables	Baseline					Endline				
	Chiraigaon		Cholapur		P value	Chiraigaon		Cholapur		P value
	N	%	N	%		N	%	N	%	
Knowledge about different colours in growth chart										
Green colour	66	100	66	100	NA	66	100	66	100	NA*
Significance of green colour	66	100	66	100	NA	66	100	66	100	NA
Red colour	66	100	66	100	NA	66	100	66	100	NA
Significance of red colour	66	100	66	100	NA	66	100	66	100	NA
Yellow colour	55	83.3	53	80.3	0.652	64	97	54	81.8	**0.005**
Significance of yellow colour	40	72.7	38	71.7	0.929	58	90.6	42	77.8	**0.049**
Correct knowledge about interpretation of different curves in growth chart										
Upward bent of curve	55	83.3	56	84.8	0.812	64	97	58	87.9	**0.048**
Straight line	48	72.7	49	74.2	0.844	63	95.5	52	78.8	**0.004**
Downward bent of curve	57	86.4	55	83.3	0.627	64	97	54	81.8	**0.005**

*NA= Not Applicable.

Knowledge about different colors in the growth chart

All the AWWs in both the blocks were aware about the presence of green and red colours in the Growth Chart and correctly signified the green colour as healthy and red colour as the zone of severe malnourishment, invariably during baseline and endline survey. Around 80% of AWWs knew about the presence of yellow colour in growth chart during baseline survey. A significant (p=0.005) difference in knowledge about this colour was observed between both the blocks (97% in Chiraigaon and 81.8% in Cholapur) during endline survey. Out of those who were aware about the yellow colour in growth chart, around 70 percent in both the blocks during baseline survey correctly stated the significance of yellow colour as moderate malnourished zone. Along with the knowledge of colour, the intervention could also significantly (p=0.049) improve the correct knowledge about significance of yellow colour in growth chart among AWWs of Chiraigaon block (from 72.7% to 90.6%) (Table 4).

Interpretation of different curves in the growth chart

Respondents were asked about their knowledge regarding interpretation of different curves in growth charts. During baseline, around 85% of the AWWs in both the blocks could explain the correct interpretation of 'upward' and 'downward' bent of curves in growth chart. While only slightly more than 70% of AWWs in both the blocks could explain the interpretation of 'straight' line correctly. Almost all the AWWs in Chiraigaon block were able to interpret all the curves correctly post intervention, while no improvement was observed in control block (p <0.05).

All 30 knowledge related questions were assigned score "1" for right answer and "0" for wrong answer. A total score out of 30 was calculated and compared. The mean score of knowledge was around 19.7 in both the blocks during baseline survey which was ranging from 12 to 26. Post intervention a significant (p<0.01) difference has been observed between the mean knowledge scores of AWWs in Chiraigaon (25.32±2.44) and Cholapur (20.35 ±2.70).

Besides that, the score was ranging from 19 to 30 in intervention block, while it was same for control block. The knowledge score of AWWs was categorized as Poor (score less than or equal to 15), Average (16 to 20), Good (21 to 25) and Excellent (more than 25). It was observed (Table 5) that during baseline survey, almost all the AWWs were having either average or good knowledge of growth monitoring, and less than 10% were having poor knowledge. None of the AWW in Cholapur and only two AWWs in Chiraigaon were having excellent knowledge in this regard. Post intervention, 48.5% of AWWs were having excellent knowledge about growth monitoring in Chiraigaon block (p<0.01), while in Cholapur the situation was almost similar to baseline.

Table 5: Categorization of knowledge score of AWWs.

Variables	Baseline					Endline				
	Chiraigaon		Cholapur		P value	Chiraigaon		Cholapur		P value
	N	%	N	%		N	%	N	%	
Poor (≤15)	6	9.1	4	6.1	0.33	0	0.0	3	4.5	**<0.01**
Avg. (16-20)	34	51.5	31	47.0		2	3.0	27	40.9	
Good (21-25)	24	36.4	31	47.0		32	48.5	36	54.5	
Excellent(>25)	2	3.0	0	0.0		32	48.5	0	0.0	
Total	66	100.0	66	100.0		66	100.0	66	100.0	
Mean score ± SD	19.72±2.77		19.79±2.64		0.898	25.32 ±2.44		20.35 ±2.70		**<0.01**
Range of score	14 (12-26)		12 (13-25)			11 (19-30)		12 (13-25)		

DISCUSSION

Growth monitoring is one of the important activities conducted by the AWWs and its sound knowledge among AWWs is of paramount importance to reduce the malnutrition burden among under five children. In the present study, only two third of the respondents in the study area were having correct knowledge about the cut off criteria for low birth weight (<2.5 kg) as per Indian standards. The findings were in accordance to the findings of the study conducted by Sondankar PD et al.[3] But contrary to this, Gurukartick J et al have shown that all the studied AWWs in Puducherry were aware about the normal birth weight of a baby.[4] The intervention in this study could significantly improve the correct knowledge about LBW among AWWs in Chiraigaon block.

A very poor knowledge about the desired weight gain of a child from birth to 3 years of age in different age groups (0-2 months, 2-4 months, 4-6 months and 6 months to 3 years) was observed in this study. Only one out of ten AWW was having correct knowledge about the desired weight gain of child between 0 to 6 months and none of

the AWW were aware about the desired weight gain of child between 6 months to 3 years. The intervention was found effective in significantly improving this desired knowledge among AWWs.

During baseline survey less than 15% of AWWs were aware about ranges of child and adult weighing machines. Post intervention, a significant improvement was observed in the knowledge regard among AWWs in the Intervention block as compared to control block. In the study conducted by Manhas S et al in Jammu, it was observed that only 25% of AWWs were familiar with the name of weighing scale used at anganwadi centre for weighing purpose.[6]

In the present study, around 70% of AWWs were considering date of birth verification as an important and first step of growth monitoring. During endline survey this proportion was significantly increased in intervention block. Bhasin SK et al and Davey A et al observed even worse knowledge of AWWs in regard to important steps of Growth monitoring.[1,7] In the same study Bhasin SK et al have also revealed that only 43% of AWWs had the knowledge that growth monitoring can be started for a child at any age below 6 years, while Jena P showed that all the AWWs were aware about the age at which growth monitoring should start.[5,7] As far as the further steps of growth monitoring are concerned, all the AWWs considered weight measurement and then correct plotting on the growth chart as important subsequent steps. As the growth monitoring is effective only if accompanied by communication for behaviour change that results in the improved growth of the malnourished child by Karkar PD et al.[8]

But many studies on ICDS have noted that this does not often occur, perhaps because many AWWs are not fully conversant with the interpretation of growth cards/curves by Gopalan C et al or because AWWs fail to effectively communicate the meaning of children's growth patterns to mothers by Vasundhara MK et al.[9,10] More than 3/4th AWWs in the present study were considering careful observation of growth curves and provide correct information to the parents regarding child's growth as important further steps of growth monitoring. Post intervention, this knowledge about the steps of growth monitoring was significantly improved in Intervention block. This sequence of key steps especially after weighing could not be enumerated by majority of the AWWs in the studies conducted by Kapil U et al and Karkar PD et al.[8,11] This poor knowledge about growth monitoring has also been highlighted by many other studies.[12-15]

In the present study, around two third of AWWs responded about placing the weighing scale on flat surface and almost similar proportion of respondents were aware about adjusting the weight reading to zero before measuring the weight. Around 80% of AWWs were having knowledge about undressing the child or ensuring minimal clothing and without shoes before measuring the weight. An unsatisfactory (around 15%) knowledge was found in the study area about, making the child stand on the middle of the scale's surface, This knowledge about correct steps of weight measurement significantly ($p<0.01$) improved post intervention. A study in Gujrat by Chaturvedi A et al had also shown in their study that about 78% of AWWs ensured minimal clothing of the child during weight measurement and the practice of checking zero-setting on the weighing scales seemed low as only 32% of AWWs checked zero setting before taking the weight and many AWWs continued to weigh the child with a positive error of as much as one kilogram.[16] While in the study by Chattopadhyay D in Hoogly District of West Bengal 60.9% of AWWs adjusted the scale to zero before weighing.[17]

All the AWWs in the present study were aware about the importance of regular growth monitoring in maintaining health of a child. This finding is similar to the finding of the study conducted by Gurukartick J et alin Puducherry. But, Tripathy M et al observed in their study conducted in Karnataka revealed that only 3% of the AWWs perceived Growth monitoring as an important responsibility of AWWs set by the ICDS. In the present study, around 60% of AWWs were having belief that growth monitoring can make difference in parental approach towards maintenance of their child's health.[4,18]

This belief could be significantly improved after intervention. The importance of growth chart in growth monitoring has been highlighted by all the AWWs in the current study, which is very similar to the findings of Sondankar PD et al.[3] This awareness regarding importance of growth chart was very poor in studies conducted by Jena P (2013)[5], Manhas S et al, Parmar M et al and Manhas S et al.[6,12,19]

More than 80% of AWWs in the present study also affirmed that severely malnourished children can be detected early with the help of growth chart and 40% perceived that it can also be helpful in providing early remedial interventions for a child in case a child is detected as malnourished.

This knowledge significantly improved through intervention in AWWs of Chiraigaon block. The findings of present study for this parameter was better than the findings of study conducted by Karkar PD et al in which about two-thirds of the AWWs listed growth monitoring as an important tool for measuring growth and/or detecting growth faltering and one-third related it as a tool for getting opportunity to give appropriate advice based on child's nutritional status. In the study by Manhas S et al, only 69% AWWs were capable of delivering constructive suggestions to a mother of malnourished child at home with the help of her (AWW) own knowledge and awareness regarding malnutrition and could play an efficient role as a care taker at Anganwadi centre.[6,8]

All the AWWs in the study area were aware about the presence of green and red colours in the Growth Chart and their significance, while yellow colour was known to around 80% of AWWs, and out of them 70% could correctly tell about its significance.

Around 85% of the AWWs could explain the correct interpretation of 'upward' and 'downward' bent of curves in growth chart; while more than 70% of AWWs could explain the interpretation of 'straight' line correctly. Post intervention, almost all the AWWs in Chiraigaon block were able to interpret all the curves correctly. These findings are supported by the study of Davey A et al. and Bhasin SK et al, which highlighted that majority of the AWWs, had adequate knowledge of growth chart interpretation and the significance of die lines on the growth charts indicating different grades of nutritional status.[1,7] While the study of Jena showed that about 23% of the Anganwadi workers were having knowledge about the flattened growth line on growth chart.[5]

The mean score of knowledge was around 65% (19.7 out of 30) in the study area during baseline survey. Post intervention a significant improvement has been observed in the mean knowledge score of AWWs to 84.3% (25.3 out of 30) in intervention block. This improvement in knowledge score is similar to findings of intervention study conducted in Vadodara by Karkar PD et al.[8] But this proportion of mean knowledge score during baseline was on higher side compared to the findings of the study conducted in Gujarat by Parmar M et al and Jena P in Odisha, but lower than the score by findings of the study conducted by Sharma B et al in Rajasthan.[5,12,21] It was observed that during baseline survey, almost all the AWWs were having either average or good knowledge of growth monitoring.

It was found that none of the AWW in Cholapur and only 2 AWWs in Chiraigaon had excellent knowledge in this regard during baseline survey. Post intervention 48.5% of AWWs were having excellent knowledge about growth monitoring in Chiraigaon block ($p<0.01$). Knowledge assessment score of AWWs was also calculated by Madhavi LH et al, in their study, and the score more than 15 was considered as "adequate knowledge".[14] Their study showed that 20% of AWWs had score less than 15, two third had score between15-20 and only 13.3% had score more than 20.

In the present study, capacity building was successful in improving the knowledge of the AWWs in regard with growth monitoring. Similar kind of effect of capacity building in improving the knowledge of the AWWs regarding ICDS services has been observed by Daxini M, et al in Vadodara.[22] The study conducted in Vadodara by Karkar PD et al also observed similar kind of significant effect of capacity building on knowledge of ICDS functionaries in regard with growth monitoring and promotion and infant and young child feeding practices.[8] A significant Impact of training workshop on knowledge about new WHO growth chart, severe acute malnutrition, and Infant and Young Child Feeding has also been demonstrated by Giri PA et al. among final-year medical students of Maharashtra.[23] The impact of training package on knowledge of Anganwadi workers on improving oral hygiene of preschool children in North Indian City has also been proved by Raj S et al.[24] The effect of reorientation of IMNCI training of anganbadi worker on morbidity & home based management of under 5 children of urban slum of southern Raipur city has also been demonstrated by Khandwal O et al.[26]

Limitations

The study is limited only to the evaluation of the changes in level of knowledge of Anganwadi Workers about Growth Monitoring component among the various six packages of service provided by ICDS. The impact of training intervention in terms of improvement in nutritional status of children in the intervention area could also not be assessed.

CONCLUSION

Based on the findings of the study, it can be concluded that the planned hypothesis could be proven and knowledge up-gradation intervention was found effective in improving the level of knowledge of AWWs in regard with growth monitoring.

Recommendations

The present study revealed that regular training or refresher trainings should be organized for the AWWs to update and improve their knowledge and thus skill regarding different aspects of services provided especially growth monitoring. Besides that, regular supportive supervision and regular interaction between supervisors and anganwadi workers is actually beneficial for the improved knowledge and thus performance of anganwadi worker.

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